# Creativity in Complex Military Systems

A Monograph

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Abstract

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The Army values creativity and encourages individuals to employ creative thinking in problem solving and planning. This reflects an understanding of the phenomenon as an individual attribute and fails to account for the systemic nature of military organizations and conflict. A systems-focused concept of creativity that defines creativity as an emergent outcome of a complex system comprised of expertise, process, and environment offers a better lens to evaluate military creativity. This definition further illustrates how the potential and nature of creativity depends upon the operational perspective. The purpose and ecology of strategy allow strategists to reinterpret the environment and develop novel ideas and logic to drive operational planning. Operational artists use similar skills to synthesize contextually-dependent operational forms employing tactical functions congruent with the logic of strategy. The unique ecology of operations, combined with its primary purpose, promotes organizational learning and experimentation in pursuit of novelty. The teleological focus of tactics combined with its prescriptive doctrine favors adaptive behaviors over creative ones. A better understanding of the nature of military creativity will allow commanders and staffs to better understand how novelty influences armed conflict. A better understanding of the system that yield military creativity would enable commanders and staffs to structure their operations process to fully exploit the potential of their formations.

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# Acronyms

| | |
|---|---|
| AAR | After-Action Review |
| ADM | Army Design Methodology |
| ADP | Army Doctrine Publication |
| ADRP | Army Doctrine Reference Publication |
| AMSP | Advanced Military Studies Program |
| CALL | Center for Army Lessons Learned |
| CAS | Complex Adaptive System |
| CGSOC | Command and Generals Staff Officers Course |
| DT | Divergent Thinking |
| FM | Field Manual |
| FLN | Front de Liberation Nationale |
| GenPlore | Generate-Explore |
| IQ | Intelligence Quotient |
| IDF | Israeli Defense Force |
| LOC | Line of Communication |
| MDMP | Military Decision-Making Process |
| PME | Professional Military Education |
| TRIZ | Theory of Inventive Problem Solving |
| TLPs | Troop-Leading Procedures |
| WfF | Warfighter Function |

# Why Military Creativity?

> We need to entertain every prospect of novelty, every chance that could result in new combinations, and subject them to the most impartial scrutiny. For the probability is that nine hundred and ninety-nine of them will come to nothing, either because they are worthless in themselves or because we shall not know how to elicit their value; but we had better entertain them all, however skeptically, for the thousandth idea may be the one that will change the world.
>
> —Alfred North Whitehead, *Dialogues of Alfred North Whitehead*

> Creativity is the cultural equivalent of the process of genetic changes that result in biological evolution, where random variations take place in chemistry of our chromosomes, below the threshold of consciousness.
>
> —Mihaly Csikszentmihali, *Creativity*

There is no standard definition for the phenomenon of creativity. The creativity research field is varied, with contributions from such diverse fields as cognitive science, psychology, systems science, and the visual and applied arts. There are two primary attributes common to most modern definitions of creativity: the concepts of novelty and value in use. Noticeably absent in military doctrine and literature is a comprehensive discussion of a theory of creativity.

The Army clearly values the phenomenon. Creativity is present in doctrine which defines operational art as "the cognitive approach by commanders and staffs–supported by their skill, knowledge, experience, *creativity*, and judgment–to develop strategies, campaigns, and operations to organize and employ military forces by integrating ends, ways, and means."[1] Army doctrine also recognizes the value of creativity in the planning process. The Army's doctrinal reference covering the operations process further states that visual information and models are "stimulating" and enhance creativity.[2] The Army's Operating Concept makes two references to creativity. First, it

[1] Emphasis added. Army Doctrine Reference Publication (ADRP) 5-0, *The Operations Process* (Washington, DC: Government Printing Office, 2012), 2-4.

[2] Ibid., 2-5.

states that doctrine is not a substitute for creative thought and initiative.[3] Second, it acknowledges that innovation is the result of creative and critical thinking and allows US forces to anticipate threats and create an advantage.[4] The Army's most comprehensive doctrinal discussion of creativity occurs in the Army's publication series devoted to mission command. Army Doctrinal Reference Publication (ADRP) 6-0 devotes one subparagraph to creativity. In it, it states the value of adopting novel approaches to operations assuming enemy forces have studied US forces' previous actions. It further states that creativity drives adaptation, the process of adjusting previous approaches to apply to a current problem, as well as innovation, the process of developing new approaches to a particular problem.[5]

The Army's doctrinal treatment of creativity leaves some confusion as to the relationship between creativity, innovation, adaptation, and agility. In fact, the term most often appears in conjunction with another term, such as innovation or critical thought. Its treatment leaves readers certain that creativity is valuable, but does not indicate ways in which to operationalize it or exploit it short of making it the responsibility of a commander. Also absent from doctrine or military literature is a discussion of how creativity may influence military perspectives differently. For example, does creativity perform the same role in strategic thought as it does in operational or tactical thought? Furthermore, how do different planning methodologies and organizational structures associated with them affect the potential to employ creativity?

This doctrinal obscurity is compounded by the Army's bias toward critical thinking and applied judgment. This bias is evident in both the institutional domain of the Army and confirmed and exacerbated in the operational domain. In addition to addressing the values of critical thinking

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[3] Training and Doctrine Command Pamphlet (TP) 525-3-1, *The US Army Operating Concept* (Washington, DC: Government Printing Office, 2014), 7.

[4] Ibid., 22.

[5] Army Doctrine Reference Publication (ADRP) 6-0, *Mission Command* (Washington, DC: Government Printing Office, 2012), 2-8.

in doctrine, the Army uses officer professional military education (PME) to further inculcate critical thinking habits in its mid-career leaders. The curricula for both the Command and General Staff Officers Course (CGSOC) and the Advanced Military Studies Program (AMSP) include blocks of instruction devoted to critical thinking. These blocks of instruction teach officers how to analyze information and arguments and produce judgments that avoid fallacious thinking. There is no similar instruction on the mechanics of creativity or novel ideation beyond how doctrinal design processes exploit new ideas and outcomes.

This bias is reinforced in the operational Army by exposure to predominantly tactical-level formations that employ the Military Decision-Making Process (MDMP). This methodology operationalizes critical thinking into a process designed to produce viable solutions to relatively well-defined tactical problems. Absent in both domains is a concerted effort to employ a complementary thinking process that leverages imagination and visualization to generate new ideas rather than adapt existing concepts into viable solutions. In short, through training and experience most officers are molded to be critical at the expense of being creative.

A better understanding of creativity will address this organizational imbalance. It will allow leaders and planners to make better decisions concerning how they will employ the operations process and conduct planning. For commanders who drive the operations process, a deeper understanding of creativity will allow them to assess how their organizational leadership skills and command environment either promote or inhibit creative thought. It will also allow them to be more deliberate with their planning guidance and problem-solving framework, as not all problems either require creative solutions or novel approaches. For planners and staff members, a deeper understanding of creativity will sharpen the distinction between criticality and creativity, facilitating more purposeful use of each set of cognitive skills. This will build competence for planners who will likely find themselves progressing through various echelons of headquarters,

each one requiring a unique mix of both skills to accomplish their mission. In short, understanding creativity will help the Army move to a more deliberate process of adaptation or innovation.

Any concept of military creativity must address how the phenomenon influences thinking and planning differently from the strategic, operational, and tactical perspective. This indicates that creativity is variable depending on both the echelon of the organization and the planning methodology it employs. Creativity from the tactical perspective focuses on problem solving and is limited to adaptive behaviors due to the prescriptive nature of doctrine. Creativity from the operational and strategic perspective focuses on both problem finding and learning. For these perspectives, organizational structure, process, and individual attributes drive creative outcomes. These are different in function and logic and necessary to each other in the practice of strategic and operational design.

This argument relies on the theoretical foundations of systems theory, complexity theory, and postmodernism. Ludwig von Bertalanffy, the founder of systems theory, defines a system as "sets of elements standing in interrelation."[6] This theory reconciles the inability of any single theory of creativity to account for the phenomenon and embraces input from multiple disciplines. This allows a military concept of creativity to account for potential individual attributes that contribute to creativity. It also allows for such a theory to address the social influences of creativity created by organizational structure and collaboration. Finally, systems theory can illustrate how a professional cohort, such as teams of commanders or operational artists, can either promulgate, ignore, or suppress creative ideas. A holistic concept of military creativity will integrate all of these elements.

To do so, a concept of military creativity must account for the complex nature of armed conflict. As Clausewitz discovered, war "is not the action of a living force upon a lifeless mass …

[6] Ludwig von Bertalanffy, *General Systems Theory* (New York: George Brazziler, 1968), 38.

but always the collision of two living forces."[7] As such, any concept of military creativity must address the fact that products of military creativity are not artifacts unto themselves, but artifacts that interact in a competitive environment in which all actors seek to gain an advantage. Evaluating creativity's influence on the key processes used by complex adaptive systems–creating variation, interaction, and selection–will further refine the systems approach discussed above.[8] Relating creativity specifically to the military processes that govern complex military systems will provide a more refined concept for military use.

Postmodernism and subjective-interpretivism also provide necessary components of a definition of military creativity. These theories address the different value and meaning that different audiences place on observations and understanding. The concept of creativity is inherently subjective as it requires value judgments when assessing both the novelty and inherent value of an artifact. Similarly, this subjectivity also occurs within military systems as well. Armed conflict, when defined as complex adaptive systems (CAS), accepts that both individuals and organizations respond to a rival's actions throughout the conduct of operations. Postmodernism and subjective-interpretivism refutes an objective meaning for any action and instead posits that each actor (individual or organization) will attribute separate, and potentially conflicting, meaning to both their own actions and those of a rival.[9]

The monograph's structure will be divided into six main sections. It will begin with a literature review to demonstrate the gap of understanding of creativity that exists in military doctrine and writings. The second section will present a proposed definition of military creativity

[7] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 77.

[8] Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York: Basic Books, 2000), xv.

[9] Mary Jo Hatch and Ann L. Cunliffe, *Organization Theory*, 2nd ed. (Oxford: Oxford University Press, 2006), 15-16.

for use in subsequent sections. The third section will evaluate creativity within the context of strategic thought using elements from the system's definition of military creativity. The fourth and fifth sections will similarly evaluate creativity from the operational and tactical perspectives respectively. The final section will present conclusions and recommend areas for future study.

When discussing planning methodologies and perspectives, systems-theory analysis will require a discussion of organizational structure and doctrine, and professional military education. This monograph will evaluate how these interrelated elements promote, inhibit, or fail to influence military creativity. This monograph will not make specific recommendations to change either doctrine or organizational structure in order to better exploit creativity. When discussing design methodologies, this monograph will consider the broader context of design as represented in military literature and organizational practices and not just the doctrinal process termed Army Design Methodology (ADM).

## Building a Systems Argument for Military Creativity

This section builds a foundation for a definition of military creativity and reviews some of the critical research in understanding the phenomenon in a military context. This review will show that current military understanding of creativity is incomplete, and thus justifies the research. Any understanding of military creativity must adopt a systems-view of creativity that underpins most current understanding by creativity researchers. The review will then highlight key concepts of complexity theory to address its critical place in understanding the unique military environment. Finally, perception and cognition research will demonstrate how this military environment influences the propensity for creativity.

Both Army doctrine and military scholarship fail to address creativity adequately. Most doctrinal references to creativity use it as an adverb to qualify a function or process. For example, the Army's definition of the art of command calls on commanders to exercise authority both

skillfully and creatively.[10] The same reference also states "[c]ritical and creative thinking facilitate understanding and support decisionmaking [sic]."[11] It further states, along with the Army Operating Concept publication, that creative thinking drives the process of innovation.[12]

There is a similar trend in military scholarship concerning creativity. Most available monographs and articles address creativity in terms of either an individual leader attribute or in terms of its influence on innovation or adaptability. Milan Vego, in a 2013 *Joint Forces Quarterly* article, addressed creativity, but only from the standpoint of organizations. While he defines organizational creativity as novelty expressed through groups of individuals, he limits his analysis of creative outcomes to those that "significantly enhance[d] combat effectiveness of one's forces through inventing a novel and unique way of arranging levels of command and their constituent elements and thereby opening the way for a nontraditional employment of one's forces in combat."[13] Unfortunately, this myopic focus on a specific range of outcomes fails to fully address the process by which groups develop creative processes or outcomes. In short, most military literature conceives of creativity as a valuable individual attribute. Early research in the field of psychology sought to explain creativity in a similar manner.

Early psychological researchers attempted to understand creativity as a pattern of thought. Most theories evolved from Graham Wallas's foundational research into creative cognition. He modeled all creative thought as progressing through four distinct stages: preparation, incubation, illumination, and verification.[14] His model allows for linear and recursive movement through the

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[10] ADRP 6-0, 2-5.

[11] Ibid., 2-8.

[12] ADRP 6-0, 2-9; TPT 525-3-1, 22.

[13] Milan Vego, "On Military Creativity," *Joint Forces Quarterly* 70, no. 3 (2013): 86.

[14] Graham Wallas, *The Art of Thought* (New York: Harcourt, Brace and Company, 1926), 79-80. Preparation corresponds to the education process of an individual and the presentation of a problem. Incubation is the process of unconscious consideration of a problem in which ideas are generated in the subconscious mind. Finally, illumination occurs when potential solutions are

various stages.[15] Other researchers equated creativity to a form of problem solving, and thus developed frameworks specifically focused on that aspect. The Creative Problem Solving methodology developed by Alex Osborne was one of the earliest and most influential models. He recommends approaching problem solving using three broad procedures: fact finding, idea finding, and solution finding.[16] Osborn defines these stages as:

> Fact-finding calls for problem-definition and preparation. Problem-definition calls for picking out and pointing up the problem. Preparation calls for gathering and analyzing the pertinent data. Idea-finding calls for idea-production and idea-development. Idea-production calls for thinking up tentative ideas as possible leads. Idea-development calls for selecting the most likely of the resultant ideas, adding others, and reprocessing all of these by such means as modification and combination. Solution-finding calls for evaluation and adoption. Evaluation calls tor verifying the tentative solutions, by tests and otherwise. Adoption calls for deciding on, and implementing the final solution. Regardless of sequence, every one of those steps calls for deliberate effort and creative imagination.[17]

Osborne's model forms the basis of many problem-solving methodologies in use today. His framework presents two critical points. First, his thinking model distinguishes between a *judicial mind* that relies on analysis to compare information and makes choices, and a *creative mind* that generates ideas. He further contends that individuals and groups must delay judgment of specific ideas until the evaluation step to prevent stifling creative ideation.[18] This process model, supported by behavior research, indicates the critical role that imaginative thought influences creative outcomes.

Modern cognition researchers built upon this foundation and looked to quantify ideation and determine what factors influence a person's capacity to generate new ideas. Early researchers

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presented when considering the idea.

[15] Aaron Kozbelt, Ronald A. Beghetto, and Mark A. Runco, "Theories of Creativity," in *The Cambridge Handbook of Creativity*, ed. James C. Kaufman and Robert J. Sternberg (Cambridge: Cambridge University Press, 2010), 27.

[16] Alex F. Osborn, *Applied Imagination* (New York: Charles Scribner's Sons, 1963), 86.

[17] Ibid.

[18] Ibid., 39-41.

attempted to determine a correlation between intelligence and creativity and found that they were not correlated beyond a certain threshold intelligence quotient (IQ), meaning that at lower IQ-levels creativity and intelligence were correlated; however, beyond that threshold they were not.[19] Researchers then posited that divergent thinking was the key for novel idea generation. Divergent thinking (DT) is employed when individuals face open-ended tasks for which there is no set solution.[20] While DT is not the same as creativity, it does correlate to an individual's capacity to generate ideas that are distinguished by their "fluency (number of ideas), originality (the number of unusual or unique ideas), and flexibility (the number of different categories implied by the ideas)."[21] This forms an important component of a system's perspective of creativity.

This phenomenon allowed researchers to develop more nuanced theories to account for creative processes by explaining how this potential core competence could lead to novel ideation. These theories are combinatorial and associative theories. Combinatorial theories, such as the GenPlore (Generate-Explore) Theory, expand on Wallas's basic theory by explaining the mechanics behind how candidate ideas are generated. It claims that individuals respond cognitively to a problem by generating a broad range of potential ideas or solutions, followed by an evaluation process that selects the most promising ideas for exploration and potential refinement into an outcome. Association theory posits that a novel idea most often occurs after an individual completes a process of associating various ideas related to the problem with the idea being that the more remote the association, the more novel and potentially creative the outcome.[22] Research tests

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[19] Mark A. Runco, *Creativity, Theories and Themes: Research, Development, and Practice* (London: Academic Press, 2014), 5-6.

[20] Ibid., 8.

[21] Mark A. Runco, "Divergent Thinking, Creativity, and Ideation," in *The Cambridge Handbook of Creativity*, ed. James C. Kaufman and Robert J. Sternberg (Cambridge: Cambridge University Press, 2010), 418.

[22] Sarnoff A. Mednick, "The Associative Basis of the Creative Process," in *The Creativity Question*, ed. Albert Rothenberg and Carl R. Hausman (Durham: Duke University Press, 1976), 229-232.

indicate that individuals can influence the degree of divergent thinking by manipulating how problems are presented to individuals.[23] This indicates that creative outcomes are influenced by more than just an individual's attributes, and thus requires a more comprehensive exploration.

Creativity researchers integrated systems theory into their research methodologies to account for the various influences on the creative process. Researchers developed numerous models that framed creative outcomes as a product of various interactions, such as between individuals, organizations, and processes. Mihaly Czikszentmihalyi presented a model that framed creative outcomes in a manner like Kuhn's model of scientific revolution. Czikszentmihalyi states that "creativity results from the interaction of a system composed of three elements: a culture that contains symbolic rules, a person who brings novelty into the symbolic domain, and a field of experts who recognize and validate the innovation."[24] This model indicates that creative outcomes require a social mechanism to recognize the value of a novel idea and a process to propagate its integration into the larger context of social knowledge (symbolic domain).

Teresa Amabile presents another systems-view of creativity that frames creative outcomes as the product of the interaction of three core elements: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation.[25] One critical element from her model concerns the relative importance of domain-relevant skills and creativity-relevant skills. While creativity researchers argued the greater importance of both skill sets, there is broad acceptance in the field that individuals require an average of ten years to gain the level of requisite expertise to develop novel ideas capable of influencing a particular field.[26] While neither is individually a comprehensive view

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[23] Robert C. Litchfield, Jinyan Fan, and Vincent R. Brown, "Directing Idea Generation Using Brainstorming with Specific Novelty Goals," *Motivation and Emotion* 35, no. 2 (June 2011): 141-142.

[24] Mihaly Czikszentmihalyi, *Creativity: The Psychology of Discovery and Invention* (New York: HarperCollins Publishers, 1997), 6.

[25] Teresa M. Amabile, *Growing Up Creative* (Buffalo: CEF Press, 1989), 42-50.

[26]Jerome L. Singer, "Concluding Comments: Crossover Creativity or Domain Specificity?,"

of creativity, both are complimentary in understanding the social mechanisms that govern creativity in organizations or professional fields as well as the individual, processual, and environmental elements that shape creative outcomes. This systemic treatment of creativity is currently absent in any military literature or doctrine.

Organizational theory research can help illuminate how an organization's structure and perception of its environment can influence the systems-inspired models of creativity discussed above. A symbolic-interpretivist perspective best illustrates these influences as it accounts for the inherent subjectivity that exists in assessing both novelty and utility, critical aspects of any concept of creativity. Symbolic interpretivism also accounts for the dialectic that exists between how organizations perceive their environment and how they act within it. It predicts that decision makers "enact" an environment by specifically responding to their perception of that environment.[27]

Organizational theory can also evaluate how organizations process their environment and actions and create organizational knowledge. John Kay defines organizational knowledge as an emergent property of pooled knowledge and expertise that can result in a distinctive capability.[28] Organizational knowledge translates into the specific procedures and methodologies organizations use to manage their interactions with their environment. As such, it is useful to evaluate how organizations learn and transfer knowledge, as both processes influence how they generate and operationalize novel ideas. James March posited two distinct forms of organizational learning. The first, exploration, occurs when organizations apply knowledge that is already known to them. The second, exploration, occurs when organizations employ new approaches of action and is usually associated with "learning organizations."[29] In short, organizational theory helps explain the

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in *Creativity: From Potential to Realization*, ed. Robert J. Sternberg, Elena L. Grigorenko, and Jerome L. Singer (Washington: American Psychological Association, 2004), 199.

[27] Hatch and Cunliffe, 88.

[28] Jon Kay, *Why Firms Succeed* (Oxford: Oxford University Press, 1995), 69.

[29] Hatch and Cunliffe, 313.

processes that organizations use to act within an environment and as such, impacts how novel ideation occurs and is put to use.

Complexity research helps explain how military organizations operate within a competitive environment. Complexity researcher Scott Page defines a complex system as any system of inter-related agents that respond to feedback within an environment in an interrelated manner.[30] Not only does complexity explain the interdependent nature of armed conflict, but rival military systems can be thought of as complex adaptive systems (CAS), systems that "interact in intricate ways that continually reshape their collective future."[31] Furthermore, complexity theorists argue that the processes of variation, interaction, and selection govern how complex adaptive systems evolve similar to the basic forces of evolutionary biology.[32] Understanding these elements of the coevolutionary environment of armed conflict is integral to understanding how creativity and novel ideation influences purposeful action in a complex environment.

Additionally, complexity research helps explain the phenomenon of creativity itself and why it is so difficult to isolate as a variable for research. Some creativity researchers view creativity itself as an emergent behavior resulting from interactions within a complex system. Within complexity research, emergence occurs when interactions lead to higher-order behaviors that cannot be explained as merely the sum of its respective interactions.[33] Creativity researchers have presented different models of how complexity explains creativity within an organizational context. One popular theory is that creativity results from how organizations structure and control collaboration of their members. Weak ties between members fosters creativity by removing some of

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[30] Scott Page, "What Are Complex Systems? The Experts Weigh In" (lecture, Santa Fe Institute, Fall 2016), accessed on November 23, 2016, https://www.complexityexplorer.org/courses/59-introduction-to-complexity-fall-2016/segments/4360.

[31] Axelrod and Cohen, *Harnessing Complexity*, xi.

[32] Ibid., xv.

[33] Steven Johnson, *Emergence* (New York: Scribner, 2001), 19-20.

the judgment barriers that inhibit ideation and imagination.[34] Understanding the interdependence between an organization and how it perceives its environment, as well as the complex system dynamic that exists within the organization, is critical for evaluating creativity within the military context.

The literature reviewed for this monograph indicates that the Army holds an individualistic concept of creativity that is centered on the role of the commander. Contemporary creativity researchers argue for a systems-view of creativity that accounts for additional influences such as organizational structure, motivation, and processes that are beyond the control of an individual. While cognitive science addresses how ideation occurs at the individual level, a multidiscipline approach is required to properly model creativity in a military context. Organizational theory accounts for how organizations make decisions and pursue purposeful action using deliberate procedures and delineation of authorities. Complexity research and evolutionary biology offer insight into how military organizations and individuals make decisions in a complex, coevolutionary environment. By synthesizing a definition of military creativity, its usefulness as a concept can be assessed by evaluating how it influences thought from specific military perspectives.

## A Systems Definition of Military Creativity

Creativity research journals are only marginally more explicit in their definitions of creativity than other research literature.[35] The broadest definition applicable to a military context

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[34] Petro Poutanen, "Creativity as Seen Through the Complex Systems Perspective," *Interdisciplinary Studies Journal* 2, no. 3 (2013): 216, accessed July 31, 2016, https://lumen.cgsccarl.com/login?url=http://search.proquest.com.lumen.cgsccarl.com/docview/1321066549?accountid=28992.

[35] Jonathan A. Plucker and Ronald A. Beghetto, "Why Creativity is Domain General, Why It Looks Domain Specific, and Why the Distinction Does Not Matter," in *Creativity: From Potential to Realization*, ed. Robert Sternberg, Elena L. Grigorenk, and Jerome L. Singer (Washington, DC: American Psychological Association, 2004), 155.

found in reviewing literature defines creativity as "the interplay between ability and process by which an individual or group produces an outcome or product that is both novel and useful as defined within some social context."[36] To adapt the above to a specific military context, this monograph proposes that military creativity is the interplay between expertise and organizational process by which military personnel or organizations produce outcomes or products that are novel and useful in achieving some form of purposeful relative advantage. This definition distinguishes creativity by expertise, process, and the military context in which actions occur, and moves beyond the limitations of theories that treat creativity solely as an individual attribute and frames it as an emergent property applicable in various contexts. A further analysis of each component will yield more insight on how the specific elements can combine to generate creative outcomes.

Individuals or organizations must possess expert knowledge or functional expertise to act purposefully within a context and generate a novel product or outcome. Mihaly Csikszentmihalyi's systems model of creativity best illustrates this point. He presents a model similar to Kuhn of a scientific paradigm in which novelty is evaluated by a field of experts who evaluate novelty within their specific domain and accept which elements will be included in the domain and thus propagated.[37] In this context, individuals must understand the specific element, rules, and procedures in use by a "field" in order to effectively present ideas or products that may potentially add to the domain. This model corresponds to Kuhn's model in that persuasion is necessary to convince a field of experts of the merit of a proposed idea.[38]

Design literature expands on the importance of expert knowledge to the creative process. This framework isolates the knowledge base from the process used to create designs to evaluate

[36] Plucker and Beghetto., 156.

[37] Csikszentmihalyi, *Creativity*, 42.

[38] Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (Chicago: The University of Chicago Press, 1996), 157-159.

creativity, arguing that it is the knowledge base that has more influence on creative outcomes than a particular process. That designers can achieve creative outcomes by using computer-assisted design processes that lack any subjective input to the process and serve only as a conversion mechanism for a specific designer to create a novel product illustrates this point.[39] Thus, a knowledge base is similar to Kuhn's disciplinary matrix, which corresponds to the ordered distribution of specific knowledge, language, and practices shared among the practitioners of a particular profession.[40] Expertise within a specific field thus allows individuals to not only generate ideas within a specific context, but also will allow them to identify gaps in knowledge which promotes novel ideation or experimentation. Expert knowledge, as well, allows individuals to make efficient use of resources by not duplicating experimentation needlessly and by allowing individuals to build upon the work of others, benefiting from their experiences.

Expertise also aids in perception, a critical component to operating purposefully within a complex system. Interaction between agents creates the events of interest within a system.[41] This refers to engagements, battles, or campaigns in a military context. Assuming rationality, agents in this context act to achieve a specific range of outcomes in accordance with their unique perception of their environment and rival agents. This perception interprets the environment and rival agents in terms of affordance, which is the propensity for something to either aid or restrict options for use within a specific context.[42] Expert knowledge, both tacit and explicit, aids an agent in identifying potential contextually-dependent opportunities for the use of resources or concepts. Those uses can either be congruent with existing understanding, resulting in an efficient use of resources or ideas,

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[39] John S. Gero and Mary Lou Maher, eds., *Modeling Creativity and Knowledge-Based Design*, (Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1993), 4.

[40] Kuhn, 182.

[41] Axelrod and Cohen, *Harnessing Complexity*, 62.

[42] James A. Gibson, *The Ecological Approach to Visual Perception* (Boston: Houghton Mifflin Company, 1979), 127-129.

or create a new combination that represents a creative outcome. Stuart Kauffman defined this finite space of potential exploration as "the adjacent possible."[43] In this light, expert knowledge extends the range of potential exploration available to an agent.

Expertise also aids in the learning process resulting from feedback or experimentation. Action in a system's context generates feedback that is subjectively interpreted by respective agents. Expertise allows agents to better understand feedback from action or experimentation and synthesize new ideas. This occurs because expert knowledge allows individuals to better perceive causal relationships between stimulus and outcomes and base those relationships on valid theories. This process of developing theories or explanations for observed phenomena is synonymous with learning. Thus, the process of synthesizing a new concept is an inherently creative act and links creative outcomes with the learning process. As management researcher David Garvin states, "new ideas are essential if learning is to take place."[44]

Individuals do not need to create new knowledge themselves to benefit from their creative potential. Individuals can enhance their creative potential by learning from others as a means to expand their knowledge base or functional expertise. This is especially important for military professionals as it is rare that an individual acts alone in an operational context. Nations employ military force through organizations. Organizations that employ a formalized knowledge management process allow its members to coordinate conceptualization beyond individual experiences and competences. Business management literature refers to these organizations as "learning organizations."[45] Learning organizations cross-level knowledge through different processes. *Articulation* refers to the process of formalizing tacit knowledge gained through personal

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[43] Steven Johnson, *Where Good Ideas Come From: The Natural History of Innovation* (New York: Riverhead Books, 2010), 30-31.

[44] David A. Garvin, "Building a Learning Organization," in *Harvard Business Review on Knowledge Management* (Boston: Harvard Business School Press, 1998), 51.

[45] Garvin, 51.

experience and expressing it in an explicit form for transfer to others. *Combination* is the process of transferring explicit knowledge from one agent to another.[46] Both processes coordinate distributed knowledge within an organization and raise the collective perception of its members, allowing them to better identify opportunities for purposeful creative exploration.

In short, expertise is a critical component of a system's definition of creativity. This expertise can be domain-specific and allow individuals to conceptualize existing knowledge and identify the limits of knowledge within a specific field. Expertise also equips individuals with the basic functional concepts that aid in perception and synthesis of other ideas and thus aids the learning process. Learning allows individuals to extend their understanding beyond the limits of their individual experience and access new concepts for synthesis and recombination in novel ways. While expertise provides the raw material for new ideas, it still requires a process to convert knowledge into new ideas or creative outcomes.

Both individuals and groups employ processes in pursuing an outcome. The basic cognitive process that governs action has three stages: perception, idea generation, and action. Idea generation is itself a two-stage process consisting of both knowledge activation followed by idea generation.[47] Additionally, the purpose for action influences how the process above occurs and thus potentially influences action. Analyzing those processes provides insight into the different elements that contribute to creativity.

When the primary focus for assessing creativity is to evaluate an outcome in terms of its purpose, creativity equates to a form of problem solving. This most strongly correlates creativity in terms of its purpose and the perception of that purpose. According to J. P. Guilford, "creative

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[46] Ikujiro Nonaka, "The Knowledge-Creating Company," in *Harvard Business Review on Knowledge Management* (Boston: Harvard Business School Press, 1998), 29-31.

[47] Bernard A. Nijstad, Michael Diehl, and Wolfgang Stroebe, "Cognitive Stimulation and Interference in Idea-Generating Groups," in *Group Creativity: Innovation Through Collaboration* (Oxford: Oxford University Press, 2003), 145.

thinking and problem solving are essentially one and the same phenomenon."[48] This results from the degree to which a situation demands a new response from an individual or organization. When individuals or organizations perceive a stimulus that requires a response, they will transition to the knowledge activations step of the action model. If available experience and knowledge adequately addresses the situation, then there is no perceived problem and an existing idea serves as the basis for action, thus idea selection occurs in place of idea generation. Only when existing knowledge fails to adequately address a situation does an individual or organization perceive a problem.[49]

When a response requires the generation of a new idea to guide behavior, the focus of creativity shifts to how individuals or organizations generate new ideas from existing knowledge. Creativity researcher Teresa Amabile refers to these skills as creative thinking and working skills, skills that "enable people to use their domain skills in new ways."[50] Put another way, creative thinking skills are the mechanics by which individuals apply expertise or knowledge to develop new ideas. Researchers have identified several distinct processes that fall within this category. The most popular are associative, metaphorical, and analogical thinking.

Associative thinking theories posit that the process of freely associating ideas of interest sequentially over time can lead to novel ideas. It further states that creative ideas occur more often in remote associates, or associated ideas that occur further from the original string of related ideas.[51] Metaphorical and analogical skills similarly promote novel ideation. Metaphor and figurative language shapes an individual's thinking. It allows an individual to experiment with associative ideation during the idea generation phase of the creative process before that individual possesses

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[48] Joy Paul Guilford, *Intelligence, Creativity, and their Educational Implications* (San Diego: Robert R. Knapp, Publisher Braziller, Inc., 1968), 122.

[49] Ibid.

[50] Amabile, *Growing Up Creative*, 46.

[51] Mark A. Runco, *Creativity, Theories and Themes*, 10.

the specific language or expertise to codify and internalize it.[52] Analogical thinking skills help refine conceptual and metaphorical associations into more practical ideas and applications. Knowledge management researcher Ikujiro Nonaka contends that metaphors create cognitive tension by relating seemingly unrelated concepts while analogies are the tools individuals use to reconcile that tension. He refers to analogies as the "intermediate step between pure imagination and logical thinking."[53]

The thinking processes above are traditionally associated with "creative" or divergent thinking. They deal specifically with ideation. Other thinking models also contribute to creativity but rather focus on the link between perception and knowledge activation. One example is Edward de Bono's concept of lateral thinking, a process of "pattern switching within a patterning system."[54] He argues that this skill allows individuals to break free from the trap of prior experience and enables them to see alternative relationships. In this, he equates broadening and changing perception to creativity.[55] This ability to perceive the environment or relationships differently may change how individuals interpret problems and extends the range of possible problem presentation and idea generation later in the problem-solving process.

The design process is an alternative problem-solving framework individuals or groups use to orient purposeful action. In relation to the basic cognitive model, design addresses all the elements (perception, knowledge activation, idea selection or generation, and action). Design relates to perception in that it is also a type of problem-solving methodology, although one for a specific type of problem. Many researchers describe a design problem as "one in which either the

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[52] Thomas B. Ward and Yuliya Kolomyts, "Cognition and Creativity," in *The Cambridge Handbook of Creativity*, ed. James C. Kaufman and Robert J. Sternberg (Cambridge: Cambridge University Press, 2010), 104-105.

[53] Ikujiro Nonaka, "The Knowledge-Creating Company," 33-35.

[54] Edward de Bono, *de Bono's Thinking Course* (New York: Facts on File, 1982), 59.

[55] Ibid., 9.

objective to be achieved or the means of achieving it (or both) are initially only poorly defined."[56] Poorly defined and ambiguous problems complicate the knowledge activation process and thus prevents idea selection from existing knowledge.

This is what fundamentally differentiates the scientific methodology from the design process. The scientific method abstracts knowledge across domains while attempting to determine what is true. In contrast, design problems focus on developing a particular solution and as such addresses what is both true and real.[57] Thus, design activity creates understanding, not observations.[58] Since design builds understanding and pursues a particular outcome, it follows that individuals or organizations must generate solutions rather than select them.[59] This emphasizes the idea-generation stage of the basic cognitive model. Following this stage, the design process yields an outcome or artifact in response to its design problem which corresponds to the final stage of the cognitive model. In short, design is both a method of inquiry and of action, and places equal emphasis on all stages of the cognitive model.

In addition to design processes, individuals and organizations can employ search processes to solve problems. Like design, search processes correlate to all stages of the basic cognitive model; however, they differ in the nature of the perceived problem and the method of determining a solution. Individuals and groups use search processes when they have a good understanding of the problem under study and knowledge and tools exist to address it adequately. This allows users to select solutions by using a deliberate, algorithmic process that applies categorized principles to

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[56] Brian Logan and Tim Smithers, "Creativity and Design and Exploration," in *Modeling Creativity and Knowledge-Based Design*, eds. John S. Gero and Mary Lou Maher (Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1993), 140.

[57] Harold G. Nelson and Erik Stolterman, *The Design Way*, 2nd Edition (Cambridge: MIT Press, 2014), 30-31.

[58] Klaus Krippendorf, *The Semantic Turn: A New Foundation for Design* (Boca Raton, Florida: CRC Press, 2006), 42.

[59] Logan and Smithers, 141.

yield an outcome. This more closely resembles idea selection than idea generation as the process relies on categorization and selection from an existing knowledge base. The Soviet process of TRIZ, or Theory of Inventive Problem Solving, is an example of a search model originating in the engineering field that later influenced the development of a similar approach in non-technical fields.[60]

In contrast to problem-solving processes, creative processes can also resemble exploration and energy-dissipation models that emphasize perception and action as the primary vehicle for creativity. Music theory illustrates how the creative process supports exploration. In the musical arts, preparation precedes performance. During preparation, musicians vary their interpretations of other composers' musical pieces or their own compositions to explore different possibilities.[61] This experimentation yields novelty as expressed by improvisation during performance for both the performer and the audience. Both will compare the actual performance with their respective expectations. The resultant unexpected variance will generate information for both performer and audience.[62] Similarly, the creative process used by visual artists can be seen as a form of exploration or experimentation not directly linked to a specific problem. Artist and researcher Tobi Zausner describes the process as "a dissipative process" in which "artists take in energy and information from their environment and discharge entropy as local examples of order which we call

[60] Gerard J. Puccio and John F. Cabra, "Organizational Creativity," in *The Cambridge Handbook of Creativity*, ed. James C. Kaufman and Robert J. Sternberg (Cambridge: Cambridge University Press, 2010), 162-163.

[61] Kathleen Coessens, "The Agile Musical Mind: Mapping the Musician's Act of Creation" in *Applications of Cognitive Linguistics,* vol.21, *Creativity and the Agile Mind: Multi-Disciplinary Study of a Multi-Faceted Phenomenon*, ed. Tony Veale, Kurt Feyaerts, and Charles Forceville (Berlin: de Gruyter, 2013), 339-341.

[62] Leonard Meyer, "Some Remarks on Value and Greatness in Music," *Journal of Aesthetics and Art Criticism* 17, no. 4 (1959): 490, quoted in Kathleen Coessens, "The Agile Musical Mind: Mapping the Musician's Act of Creation" in *Applications of Cognitive Linguistics: Creativity and the Agile Mind: Multi-Disciplinary Study of a Multi-Faceted Phenomenon*, ed. Tony Veale, Kurt Feyaerts, and Charles Forceville (Berlin: de Gruyter, 2013), 343-344.

art."[63] This negentropic process results in information expressed as a work of art.[64] In short, both processes result from intrinsic motivation to explore ideas within an artistic medium rather than respond to a specific problem.

The discussion above outlines the process by which individuals or organizations produce outcomes from expertise and process. Within a systems context, these outcomes create feedback that in turn influence the propensity for that outcome to influence the environment. Environmental and organizational factors influence the success and value of novel outcomes and artifacts. There are two primary lenses to use to evaluate the value of novelty in a systems context: internal evaluation and competition.

Internal evaluation affects the propensity for novelty through the deliberate use of policy in selecting or evaluating ideas or outcomes. Axelrod and Cohen refer to individuals who alter consequences using rewards and constraints as "policy makers."[65] This use of policy to select actions will either enable creative outcomes or limit the space of acceptable outcomes. Both formal members of an organization and elements outside of an organization can exert policy pressures that influence creative outcomes. For example, leaders within an organization can institute policies that promote innovation and dedicate resources to producing novel products or ideas. This is common in business organizations such as 3M who require employees to devote a certain amount of time to experimentation and research.[66] In these instances, policy makers align incentives with entrepreneurial behavior to stimulate new ideas and experimentation. Businesses develop and

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[63] Tobi Zausner, "The Creative Chaos: Speculations on the Connection Between Non-Linear Dynamics and the Creative Process," in *Studies of Non-Linear Phenomenon in Life Sciences*, vol. 5, *Non-Linear Dynamics in Human Behavior*, ed. W. Sulis and A. Combs (Singapore: World Scientific, 1996), 343-345.

[64] Ibid.

[65] Axelrod and Cohen, *Harnessing Complexity*, 20.

[66] Jim Collins and Jerry I. Porras, *Built to Last: Successful Habits of Visionary Companies* (New York: Harper Business, 2002), 156-159.

market new products or improvements on existing products to a market. Market participants evaluate the merit of the product in relation to its prices and decide to either purchase it or not. This behavior at the macro level sends feedback signals to the business expressed as a price.[67] Businesses will then continue marketing that product so long as its price creates an acceptable profit after considering production costs. Over time, that profit will change as competitors enter the market to either directly compete against that product or introduce new products using the same resources. Here again, competition will create evolutionary pressures as all market participants reconsider their respective costs in light of market feedback that revalues each product in relation to competing combinations of resources.[68] In this framework, feedback is less subjective and exogenous to the individual or organization generating novel ideas or artifacts.

In short, both internal and external pressures influence the potential for and value of novel outcomes. Policy can promote or inhibit the potential for novelty by restricting access to resources for experimentation or exploitation, thus miring the creativity in the idea-generation phase. Similarly, competition creates feedback in a systems context that influences the perception of success or failure of novel ideas or products. This feedback will compel individuals or organizations to either adapt, innovate, or fail as an entity.

To review, creativity is not a single process, but an emergent outcome from systemic interactions. This basic system comprises expert knowledge, process, and the environment. Expertise provides the foundation of concepts and understanding from which novel combinations can occur. Individuals and organizations use cognitive tools and formal or informal processes to develop and operationalize novel ideas. Subsequently, environmental factors influence the propensity to operationalize new ideas or provide direct feedback as to the acceptability and value

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[67] Friedrich A. Hayek, *Individualism and Economic Order* (Chicago: University of Chicago Press, 1980), 99-100.

[68] Ibid., 104-105.

efforts to promote innovation. In contrast, professional organizations or academia can influence the success or failure of novel ideas or products. They do so by either endorsing or disapproving candidate ideas or artifacts. Thomas Kuhn provides numerous examples of how the scientific community fought against the acceptance of new ideas in order to preserve the preeminence of older members of the professional community who champion existing theories.[69] Social construction theory explains this inclination to suppress new ideas as a way in which a professional body perpetuates its monopoly on specialized social knowledge.[70] Whereas the above discussion outlines how internal factors influence the acceptability of new ideas, external factors do so as well.

Competition is the primary external force that influences the acceptance of novel ideas and artifacts. It does so when feedback from competition denotes success or failure of an idea and that perception becomes the predominant factor in coordinating subsequent action. Economic theory equates competition with the process of discovery in which distributed actions by consumers determine acceptable prices for products. Producers subsequently make decisions to either accept their production process as is, improve it to remain competitive in the market, or leave the market for that product due to an inability to make a profit at the market price.[71]

While the discussion above addressed each of these items separately, that is not to imply that individuals or organizations apply such a linear methodology or treat each element as a discrete process. It is precisely this rich interconnectivity that makes creativity a difficult subject to address and why academic references to it adopt a black-box approach in which researchers accept the phenomenon, but decline to discuss how it emerges. Understanding creativity as a system of the

[69] Kuhn, 152-159.

[70] Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Anchor Books, 1967), 86-88.

[71] Hayek, 96-101.

above interconnected elements, while not a complete model, allows readers to conduct a comparative analysis incorporating creativity.

The sections that follow will evaluate creativity from various military perspectives to discern how each of the elements from this section influence the nature, value, and purpose of creative outcomes. This paper argues that the unique ecological structure of military operations from the tactical, operational, and strategic perspective will yield differing opportunities for creative outcomes in both propensity and use. While the arguments will primarily address the systems framework above, additional elements unique to that perspective that influence that framework will be considered.

## Creativity and Strategy

The proposed systems-definition of creativity will help illustrate the propensity and nature of creativity in the strategic context. There are numerous definitions of military strategy; most of them in some manner define strategy as the alignment of ends and means in pursuit of political objectives.[72] This monograph rejects such a positivist concept and rather adopts an abstracted definition anchored in postmodern thought and focused on the implicit goal of strategic action. Such a definition views strategy as "a plan for continuing advantage."[73] This definition provides crucial insight beyond what its brevity suggests. Foremost, strategy relates to planning, which fundamentally frames strategic thought as temporally-focused on potential futures. Later discussions of tactics and operations will show the importance of temporal focus. Furthermore, the focus on advantage implies that a strategist makes a judgment about conditions relative to something else. Two key insights are important. First, actions by rivals or changes in the environment potentially alters how the strategist judges advantage, indicating that no existing

[72] Basil Henry Liddel Hart, *Strategy* 2nd ed. (New York: Meridian, 1991), 322.

[73] Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Frank Cass, 2005), 18.

program of action or thought satisfactorily ensures maintaining advantage. This suggests that each strategic context warrants a specific approach to seek advantage. This potential for change leads to the second key point about this definition: it does not ground strategy into a prescriptive set of actions or logic, but allows for multiple ways to achieve or maintain advantage.

Put simply, the function of strategy, rather than its process, provides a better definition for evaluating other concepts as they relate to strategy. Therefore, for the purposes of this monograph, strategy is the logic and actions that guide military efforts to gain or maintain perpetual advantage. This definition provides a basis to illustrate the importance of creativity in the context of strategy. Creativity demands novel ideation to generate theories of advantage and action in executing strategic thought. These theories provide the foundation for developing novel artifacts that guide action and influence the ecology of strategy.

Strategy relies on creative potential to both perceive the strategic environment and develop a guiding logic to act within it. It follows that a strategist must first develop a theory of the environment and its circumstances before considering how to generate some form of advantage. This process requires two specific types of theorizing: descriptive and normative.[74] The ability to perceive and describe accurately the environment and rivals will influence the creative space that will guide subordinate action. Broadly, originality, flexibility, and fluency characterize novel ideation.[75] Those skilled in divergent thinking will produce ideas that stress one or more of the characteristics above and lead to higher probabilities of creative outcomes. The value of divergent thinking is evident in thinking about the strategic environment itself. Divergent thinking allows a

[74] Descriptive or empirical theories describe the environment as it is. Normative or value theories guide how one should act in the presence of specific circumstances or phenomenon. For more information see James N. Rosenau, "Thinking Theory Thoroughly," in *The Scientific Study of Foreign Policy*, rev ed. (London: Frances Printer, 1980), 20-23.

[75] E. Paul Torrance, "Education and Creativity," in *The Creativity Question*, ed. Albert Rothenberg and Carl R. Hausman (Durham, NC: Duke University Press, 1976), 219-223.

strategist to more accurately perceive the environment, develop original theories to explain why it is so, and challenge cognitive bias that distorts thought.

Lateral thinking, a specific form of applied divergent thinking, influences how readily a planner can avoid the influence of patterned thought. Recall that humans access knowledge stores in response to information before deciding whether to apply a previously-developed solution or generating a new idea to govern action.[76] This knowledge access process relies on thought structures called schemas to organize and interpret information observed in the environment.[77] Humans are prone to either ignoring contradictory information that fails to conform to the dominant schema or subconsciously fabricating missing details in order to match the schema pattern.[78] Those skilled in lateral thinking are conscious of this potential for bias and deliberately look for different ways to reinterpret their observations.[79] Such individuals expand the space for critical and creative thought by ensuring accuracy of perception.

This is particularly important since such perception influences the foundation of a theory of advantage that guides strategic thought. It is important to note that such a theory must account for both the environment and a rival. Such thinking demands second-order understanding of a rival, which accounts for the rival's understanding of the environment and its influence on its strategic logic and capabilities[80] It is clear that strategists must develop new ideas to account for the contextual nuance of the environment when developing a strategic estimate. These ideas will

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[76] Nijstad, Diehl, and Stroebe, 145.

[77] Stanley G. Harris, "Organizational Culture and Individual Sensemaking: A Schema-Based Perspective," in *Cognition Within and Between Organizations*, ed. James R. Meindl, Charles Stubbart, and Joseph F. Porac (Thousand Oaks, California: SAGE Publications, 1996), 287.

[78] Ibid.

[79] Edward de Bono, *The Mechanism of Mind* (New York: Simon and Schuster, 1969), 230.

[80] Krippendorf defines second-order understanding as understanding that accounts for how the user of a design artifact will interpret its meaning. In this context, second-order understanding applies to how a rival views and interprets the environment.

influence how strategists define, assess, and ultimately seek to influence advantage. Only original thinking can conceptualize the foundational theory of advantage that should guide strategic action. History provides an example of the value of lateral thinking and second-order understanding in strategy.

T. E. Lawrence demonstrated the power of lateral thinking in perceiving strategic advantage during the Arab Revolt. Following the Arab seizure of Wejh, Lawrence paused to consider the strategic environment. Prussian-influenced Western convention indicated the next logical step for the Arabs would be to attack the Turks concentrated in Medina. This conformed to Clausewitz's idea that war was a duel between forces seeking to overthrow each other.[81] In this manner, armies became the objectives of operations aimed at their destruction. However, Lawrence perceived new insight into the Arab position by considering the environment from the Turkish perspective, a critical first step in developing second-order understanding. This led him to see the unique advantage the Arabs possessed due to circumstances. First, the Turks were compelled to secure their lines-of-communication (LOCs), especially the railway, to maintain their modern force. This created an insurmountable math problem for the Turks since they lacked the manpower required to guarantee their LOCs over such distances. This forced them to become sedentary, a position exacerbated over time by their need to consume their horses to compensate for disruptions to their supply lines, further eroding their mobility and thus their ability to contest rebel influence.[82]

This dynamic created the dilemma that Lawrence perceived as advantageous. Rather than rivals, he conceptualized armies as "plants, immobile, firm-rooted, nourished through long stems to the head."[83] Here is evidence of how affordance is both objective and subjective in generating

[81] Clausewitz, 75.

[82] T. E. Lawrence, *Seven Pillars of Wisdom: A Triumph* (New York: Random House, 1991), 188-189.

[83] Ibid., 192.

meaning. The physical disposition of the Turkish force generates a specific insight to Lawrence as the observer, but only because he is able to alter his interpretation of the nature of a modern army. This demonstrates the integrated nature of cognition and how "affordance points both ways, to the environment and to the observer."[84] Lawrence further demonstrated divergent thinking in how he conceived of the Arab forces. Rather than an "army of banners," he viewed the Arabs as "an influence, an idea, a thing intangible, invulnerable, without front or back, drifting about like a gas."[85] Here, Lawrence eloquently demonstrates the value of metaphor and analogical thinking in generating novel theories to describe the environment. He further exposes the concept of efficacy, or shi, that is cental to ancient Chinese strategy. Shi corresponds to propensity created by the interaction of forces and environment.[86] More simply, shi represents a form of potential energy created by the holistic environment and history. This concept as illustrated by Lawrence matches well with more modern concepts of strategy that seek to create or maintain structures that perpetuate advantage.[87] In this framework, the structure represents the favorable dispositions and tendencies created and exploited by the strategist. In short, Lawrence used lateral and divergent thinking to develop a contextually-specific understanding of the environment. This new knowledge results from novel perception and ideation, both creative acts that result from the expertise and thinking abilities of the individual strategist. However, strategists still require a theory of action to exploit this novel insight.

In addition to novel insight about the environment, divergent thinking influences the development of theories of action to achieve or maintain strategic advantage. Two things become evident in following this logic. First, any logic of action must be novel due to the contextually-

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[84] Gibson, 129.

[85] Lawrence, *Seven Pillars of Wisdom*, 192.

[86] Francois Jullien, *The Propensity of Things: Toward a History of Efficacy in China*, trans. Janet Lloyd (New York: Zone Books, 1999), 15-17.

[87] Dolman, 157.

dependent theory of the environment it is to influence. Lawrence again provides an example of novel ideation in how he envisioned the Arabs capable of exploiting the advantage described earlier. To exploit the immobility of the Turks, Lawrence advocated that the Arabs attack their materiel and lines of communications. In his words, the Arabs should fight a "war of detachment" in which "[t]he death of a Turkish bridge or rail, machine or gun or charge of high explosive, was more profitable to us than the death of a Turk."[88] This kind of war exploited the detrimental tension the Turks faced in sustaining a modern military on an extended logistical tether. Their mass forced them to safeguard their LOCs, which in turn made them more sedentary and less capable of imposing their preferred kind of war on the Arabs. This allowed the Arabs to deny battle to the Turkish force and exploit their superior mobility to further erode the Turkish position in Arabia. This dynamic allowed the Arabs to conduct operations within their technical means and exploit the propensity of the Arabian desert as a "space greater than the power of armies."[89] This allowed them to look beyond the presence of the Turks and realize that final victory was certain, provided they could inculcate their concept of freedom among the provinces.[90] This logic evolved from Lawrence's conceptualization of the environment as a tension between mass and an intangible gas.

In addition to requiring a novel theory to guide action, the temporal nature of the strategic environment is indefinite and thus requires perpetual reframing to account for change. Complexity theorists would describe this dynamic as a complex adaptive system in which all actors seek a superior fit within the competitive environment.[91] This indicates that as rivals put their strategies in action, relationships will change the environment and potentially alter the original guiding theory of the environment. Thus, the goal of strategy is not to simply achieve advantage, but to maintain

[88] Lawrence, *Seven Pillars of Wisdom*, 194.

[89] Ibid., 196.

[90] Ibid.

[91] Axelrod and Cohen, 8.

perpetual advantage in light of changes induced by rivals or the environment itself. This explains why strategic advantage equates to degrees of freedom in action. An actor with a greater capacity to induce or react to change has a competitive edge in the evolutionary context of conflict. This results from their ability to create more variation or to perceive more aptly which variations will be advantageous in the changing environment. Two prominent strategic theories illustrate how creativity and the ability to induce novelty is at the heart of strategy.

Ancient Chinese strategy seeks to exploit superior adaptability to the potential created by shi, or environmental disposition, relative to a rival. Rather than focus on actions, Chinese strategy focused on the set-up and efficacy of a complex adaptive system.[92] This provides an advantage for the actor who can better adjust and manipulate the structure of the environment to employ shi.[93] This corroborates modern theories that focus on the structure of competition as a lever to create and exploit strategic advantage.[94] This theory seeks to shape the environment to gain certainty of victory should a rival choose to fight rather than accept defeat. Thus, adaptation to the environment is what denotes superior strategy in the mind of ancient Chinese strategists. While theories on efficacy seek advantage through outright superior adaptation to circumstances, other theories seek advantage by limiting a rival's ability to understand the environment and cope with change.

John Boyd developed a theory that equates strategy to purposeful actions that deny a rival the ability to adapt to change. His theory rests on an ability to secure an advantage early and prevent a rival from recovering and compensating.[95] Actors do so by continuously introducing novelty within the environment, adding both energy and complexity to the system. Over time, variation compounds and prevents the rival from accurately perceiving or understanding the

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[92] Jullien, 37.

[93] Ibid., 33-34.

[94] Dolman, 157.

[95] Frans P. B. Osinga, *Science, Strategy, and War: The Strategic Theory of John Boyd* (New York: Routledge, 2007), 125.

environment. This prevents a rival from acting with cohesive logic due to the mismatch between their perception of the environment and the reality being enacted by the actor.[96] This strategy exploits a rival's continued reliance on a schema that is no longer capable of perceiving or understanding an actor's logic. In other words, the rival is incapable of generating either new theories of the environment or of action. Over time, a rival loses degrees of freedom of action due to this loss of coherence. In short, the two theories above demonstrate the central role that creativity plays in strategic thought. Both equate advantage with a superior ability to create and exploit variation within the strategic environment. The novel ideas guiding those variations along with guiding strategic logic are creative outcomes. Strategy also has a dialectic influence on the forces that shape the strategic environment.

Strategy influences the materiel and capabilities-development decisions a nation makes. Numerous writers have addressed materiel innovation and modernization, so this monograph will only briefly address the point to highlight the role strategy has in determining its own means. Materiel and resource limitations bound the limits of action available to a strategist in a way similar to cognitive constraints. Here again evolutionary biology illustrates an important point. Recall the "adjacent possible" argument that states there is a finite range of potential mutations or change possible within a system.[97] It follows that a nation's resourcing, modernization, and training decisions will similarly define the limits of potential actions or capabilities it can employ. In this manner, a nation's concept of strategic advantage will influence the development of the means to achieve that advantage. This dynamic can also reduce freedom of action. Capabilities rather than logic can become the focal point of strategic decisions if modernization proceeds divorced from the logic that will employ it. This limits thinking to employing systems rather than exploiting them as a tool to enact a strategic logic. This reduces thinking from a strategic horizon focused on change to a

[96] Osinga, 125-126.

[97] Steven Johnson, *Where Good Ideas Come From*, 31.

tactical one that seeks finality.[98] Here again recall the Turks mired in the Arabian desert attempting to fight an idea with modern weapons.

In summary, creativity is central to strategy. Strategists seek to gain and maintain perpetual advantage. Strategists develop novel theories to describe and guide action within a competitive environment to account for the contextually-unique circumstances. This environment favors the actor who can introduce more influential variation into the system, thus inducing change. This difference yields learning for the actor creating the change while potentially inducing shock on a rival. Actors maintain coherence when their actions are congruent with their strategic logic and environment. An inability to perceive and adapt to change will limit freedom of action over time, ceding advantage to a rival. In short, the creative process itself, tempered with judgment, is what yields strategic advantage. A discussion of creativity's importance to how operational artists enact strategic logic will now follow.

## Creativity and Operational Art

Similar to tactics, operational art has both a theoretical and doctrinal foundation that influences the nature and manifestation of creativity. In general, theory defines operational art as "the grey area between strategy and tactics, operational art spans the theory and practice of planning and conducting campaigns and major operations aimed at accomplishing strategic and operational objectives in a given theatre of operations."[99] Similarly, Army doctrine defines operational art as "the pursuit of strategic objectives, in whole or in part, through the arrangement of tactical actions in time, space, and purpose."[100] Both definitions indicate that operational art is an

[98] Dolman, 5.

[99] John Andreas Olsen and Martin van Creveld, "Introduction" in *The Evolution of Operational Art* (Oxford: Oxford University Press, 2011), 1.

[100] Army Doctrine Publication (ADP) 3-0, *Operations* (Washington, DC: Government Printing Office, 2016), 4.

intermediate process that uses synthesis to translate the logic of strategy into an operational form that employs the functions and capabilities of tactics. The purpose of operational art, its constituent processes, and the unique ecology of operations creates opportunities for creativity related to theorizing, learning and developing novel operational approaches.

As stated above, the purpose of operational art is to put form to guiding strategic principles. This implies that applying operational art will yield some form of artifact as an output. Furthermore, it follows that the process of synthesis requires operational artists to theorize about oneself, the environment, and rivals. This monograph argues that both the outputs themselves and the theories developed during the process are novel and thus creative.

Foremost, the contextually-dependent nature of operational planning ensures all operational approaches are novel. This is evident when one considers the difference between tactics and operations. From the tactical perspective, friendly forces and rivals have intersubjective understanding as both understand their rival and environment through the same context of tactics. Both seek to impose a specific outcome relative to their rival or the environment and both understand those effects in the same light.[101] In short, the grammar of tactical action is universal. In contrast, planners use operational art to develop an approach that reconciles the guiding logic of strategy with the influences of a rival's actions. Since rivals are subject to different strategic guidance, one cannot assume that rivals hold intersubjective understanding as each rival may view himself, the environment, and the meaning of their interactions differently. Thus, the purpose of operational art is to develop a unique approach congruent with the logic of strategy relative to an understanding of a rival. In short, operational art demands the continuous development of contextually-dependent, novel theories capable of directing practical action. Operational art still requires a process to put form to those theories and guide purposeful action.

[101] Dolman, 13.

As discussed above, operational art is closely associated with ambiguous, difficult problem sets due to the unique nature of synthesizing strategic logic into a contested environment. This interaction creates complex, ill-defined problems, indicating that operational art (especially early in an operation) demands a conceptual approach to planning. As discussed previously, design processes are one method of conceptualizing ill-structured problems.[102] As a process, design promotes creativity throughout its conduct and in its resultant artifacts (design products).

Foremost, the design process requires developing both descriptive and prescriptive theories, both of which require novel idea generation in the context of operational art. The Army's design process, ADM, corresponds to the theoretical treatment of design as a method of inquiry focused on seeing oneself in the environment, envisioning a desired future state, and developing a way to bring about the desired change of states.[103] Environmental and problem framing equate to developing theories that describe the environment. Thus, theorizing is synonymous with idea-generation. Furthermore, these ideas must be novel to account for the contextual nuance of the complex interaction between oneself, a rival, and the environment. This contextual distinction further prevents planners from using a "search" methodology, available to tactical planners, for solving the operational problem. Tactical planners can select, from an existing array of tactical tasks, the appropriate combination of effects to achieve their mission. In contrast, operational artists develop approaches that use more conceptual tools to communicate requirements. These objectives may not perfectly correspond to a known doctrinal task. Thus, operational artists demand a novel theory of action to achieve their desired end state. In short, operational artists create new knowledge when using ADM as a sense-making and conceptual planning tool. While the steps of ADM will always

[102] Logan and Smithers, 140.

[103] Army Techniques Publication (ATP) 5-0.1, *Army Design Methodology* (Washington, DC: Government Printing Office, 2015), 1-3 – 1-4.

yield novel insight and approaches when used for operational planning, how planners conduct those steps also contributes to creativity.

The non-prescriptive and collaborative nature of ADM extends the pool of expert knowledge and promotes divergent thinking, both critical elements in determining creative outcomes. Army design doctrine advocates that planners conduct framing activities collaboratively.[104] It follows that this alone extends the pool of expert knowledge available to planners; however, this collaboration, combined with the loose guidelines outlining design steps, create more opportunities to apply that knowledge creatively. Recall that in tactical planning, there is pressure for planners to only look at a problem through the lens of their particular warfighter function for the purpose of creating a predefined deliverable. In design, doctrine is less prescriptive about what those deliverables are, demanding only that the presentation products include both a narrative and a graphic.[105] This type of collaboration allows planners to abandon their specific functional expertise and engage other knowledge stores and experiences during framing activities. This impacts the propensity for creativity in two important ways. First, this framing-focused collaboration reduces the "norming" pressure that would exist if a team member could claim expert knowledge.[106] Second, this plurality of views creates tension between ideas that can lead to new knowledge (also a creative outcome) when the group explores the rationale behind the divergent views to reconcile the differences.[107] Collaboration in short is the medium that coordinates the distributed knowledge and experience of a design team; however, knowledge alone does not guarantee a novel outcome. It is clear that how an individual perceives the environment and uses

[104] ATP 5-0.1, 1-7.

[105] Ibid., 1-9.

[106] Frances J. Miliken, Caroline A. Bartel, and Terri R. Kurtzberg, "Diversity and Creativity in Work Groups: A Dynamic Perspective of the Affective and Cognitive Processes that Link Diversity and Performance," in Meindl, Stubbart, and Porac, 46-47.

[107] Ikujiro Nonaka, "The Knowledge Creating Company," 43.

knowledge contributes to operational planning and creative outcomes. Some researchers refer to these skills as divergent thinking.

Divergent thinking contributes to creative outcomes during design by enabling individuals to avoid thought-constraining bias and more accurately interpret information. Framing is synonymous with perceiving the environment and theorizing why it is so. Lateral thinking confers the same benefits to operational artists as to strategists in that it enables a more precise interpretation of information during framing activities and reduces the chance for perceptual error. Those skilled in lateral thinking use techniques to question their initial understanding of the environment and purposefully look for alternative explanations or interpretations for what they perceive.[108] This leads to a more accurate and deeper understanding of the environment during framing. This in turn can lead to "creative destruction" in which long-held patterns of thought give way to more novel understanding and generates more options for action.

One particular method of lateral thinking is "escape" thinking. The "escape method" advocates examining that which we take for granted and questioning "if they are the only and best way of doing things."[109] The Israeli Defense Forces attack on the Kasbah of Nablus in April 2002 demonstrate the value of this method. The Israelis, determined to clear guerrilla fighters from the Kasbah and a nearby refugee camp, reconceptualized how they saw the urban terrain that housed their enemy. This led to a novel operational form. In the words of their commander at the time:

> This space that you look at, this room that you look at, is nothing but your interpretation of it. Now, you can stretch the boundaries of your interpretation, but not in an unlimited fashion, after all, it must be bound by physics, as it contains buildings and alleys. The question is: how do you interpret the alley? Do you interpret the alley as a place, like every architect and every town planner does, to walk through, or do you interpret the alley as a place forbidden to walk through? This depends only on interpretation. We interpreted the alley as a place forbidden to walk through, and the door as a place forbidden to pass through, and the window as a place forbidden to look through, because a weapon awaits us in the alley, and a booby

[108] Edward de Bono, *de Bono's Thinking* Course, 69-70.

[109] Ibid.

> trap awaits us behind the doors. This is because the enemy interprets space in a traditional, classical manner, and I do not want to obey this interpretation and fall into his traps.[110]

In this instance, the Israelis developed a new understanding of the environment. Rather than view the open urban spaces as maneuver corridors through which they must pass to attack the enemy, they instead viewed them as forbidden areas. This led them to see the very structures that used to indicate cover and concealment as the very medium of warfare, a three-dimensional space of constant change and opportunity.[111] This is evidence of the value of breaking patterned thought and the novel ideas that result from changing perspectives.

Army design doctrine promotes divergent thinking to stimulate creative thought. For example, it advocates using mind mapping as a technique to explore relationships between variables or actors during environmental framing [112] Recall that more remote associations can lead to more novel ideas or perceptions, both of which could lead to more creative frames or operational approaches. Doctrine also advocates the Four-Ways-of-Seeing process to promote lateral thinking. This technique tasks planners to view the environment and interactions from the perspective of other actors.[113] This forces planners to question their own understanding and perception of the environment, potentially leading to deeper insight, better second-order understanding of their rival, and more creative options for action.

Doctrine further advocates a deliberate sequencing of divergent and convergent thought to generate creative outcomes. This is evident in how it recommends groups approach brainstorming during framing activities. Doctrine recommends deliberately breaking brainstorming into distinct divergent and convergent phases. During the divergent phase, individuals generate as many ideas as

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[110] Aviv Kochavi quoted in Eyal Weizman, "Walking Through Walls," accessed on March 16, 2017, http://eipcp.net/transversal/0507/weizman/en.

[111] Eyal Weizman, "Walking Through Walls," accessed on March 16, 2017, http://eipcp.net/transversal/0507/weizman/en.

[112] ATP 5-0.1, 3-10.

[113] ATP 5-0.1, 3-12.

possible to describe the environment or identify relevant actors or relationships. It recommends that individuals work alone before meeting rather than working simultaneously as a group. When complete, doctrine advocates adopting a convergent approach to making sense of the pool of ideas and concepts. It recommends using affinity mapping to logically cluster ideas for discussion and practical synthesis.[114] This conforms with research that indicates individual efforts (divergent thinking) best support idea generation while group efforts (convergent thinking) best supports evaluation.[115] This balance reduces some of the barriers to creativity. Working separately reduces the influence of bias and cognitive blocking inherent in group work. This expands the breadth and flexibility of ideas.[116] Using groups to evaluate and explore ideas adds depth to ideas. Research indicates this is an optimal division of labor for generating ideas.[117] In short, divergent thinking promotes novel ideation in two critical ways: it helps break the trap of patterned thought to perceive an environment more precisely, and helps inculcate habits of thinking that generates more creative ideas. Both influence how operational artists understand their environment and attempt to act purposefully within it.

The discussion above illustrates how divergent thinking skills enable creative outcomes when conducting doctrinal design processes. Divergent thinking helps individuals generate novel ideas about how they see the environment and how to act purposefully within it. Doctrine further suggests ways to coordinate individual and collaborative work to result in the best mix of divergent and convergent efforts. The final element to consider in the operational design process is the resultant design concept itself. Examining the specific form of this artifact exposes additional

[114] ATP 5-0.1, 3-7 – 3-8.

[115] Nijstand, Diehl, and Stroebe, 157.

[116] Steven M. Smith, "The Constraining Effects of Initial Ideas," in Paulus and Nijstad, 29.

[117] Nijstad, Diehl, and Stroebe, 157.

applications of creativity. The design narrative and sketch create meaning and context for those uninvolved in the design process but who must operationalize its form.

The design narrative does more than just describe the environment and direct action—narrative shapes the perception of the environment and communicates the operational artist's understanding of it. It translates contextually-specific knowledge into communication, increasing the likelihood of creating shared understanding with those who will execute the design concept.[118] Further, it "defines the dimensions in which the reader is likely to view the mentioned artifact."[119] The important role language plays in narrative and cognition explains how this occurs. Language constructs, such as metaphor and analogy, build the context for subordinates to interpret the novelty of the desired operational form. They capitalize on existing conceptual frameworks and schemas as a foundation to interpret the new artifacts.[120] Recall the IDF's new way of viewing urban terrain in Lebanon for an example of this process. The commander relied on metaphor to describe how he envisioned the IDF operating within Nablus. He used terms like "infestation" and "swarming" to help subordinates adopt a similar view of urban terrain as a navigable, three-dimensional space.[121] It further indicated that he desired his forces to attack targets simultaneously from multiple directions and then quickly disaggregate.[122] Thus, these metaphors described both an alternate way of sensing the environment as well as a new way of maneuvering within it.

In addition to helping subordinates understand new concepts, narratives explain the meaning behind an operational form as a whole. Humans rely on narrative as a device to make

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[118] Hayden White, "The Value of Narrativity in the Representation of Reality," *Critical Inquiry* 7, no. 1 (1980): 5, accessed on March 17, 2017. http://www.jstor/stable/1343174.

[119] Krippendorf, 54.

[120] Antoine Bousquet, *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity* (New York: Columbia Press, 2009), 26-27.

[121] Weizman, "Walking Through Walls," accessed on March 19, 2017 http://eipcp.net/transversal/0507/weizman/en.

[122] Ibid.

sense of the environment or concepts. Language builds realities that provide context for understanding an artifact.[123] Narratives carry "ideas and judgments" that construct that meaning.[124] This is apparent in how narratives address the element of time. Time is a critical element of operational art that differentiates operational art from tactics. In tactics, planners focus on bringing discrete, singular events to a successful conclusion. Operational artists may arrange numerous events in time and space to enact its strategic logic. Narratives offer planners a way to present an operational form that indicates its temporal construct as well as communicate its foundational logic. This temporal construct implies a causal link between events and their antecedents.[125] The aggregation of events represent a pattern that constitutes a plot, which is synonymous with the foundational theory of action tied to that specific potential reality.[126] Thus, narrative is a vehicle to create new ways of making sense of an environment and are themselves creative artifacts.

Planners also use graphical sketches as a vehicle to create shared understanding. Graphical expression employs a different set of skills than narrative expression. It offers the unique ability to visually depict the spatial, conceptual, and temporal relationships within an environment. This creates a "virtual world" that allows for experimentation in support of theorizing.[127] As artifacts, drawings support both the planning and presentation aspects of design. They complement design narratives and extend the medium of dialogue during collaboration. The drawings themselves offer opportunities for novel expression and can promote lateral thinking by influencing perception and

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[123] Krippendorf, 20-21, 59.

[124] H. Porter Abbott, *The Cambridge Introduction to Narrative*, 2nd ed. (Cambridge: Cambridge University Press, 2008), 67.

[125] Paul Ricoeur, "Narrative Time," *Critical Inquiry* 7, no. 1 (1980): 171, accessed on March 17, 2017. http://www.jstor.org/stable/1343181?seq=1&cid=pdf-reference#references_tab_contents.

[126] Ibid., 178.

[127] Donald A. Schon, *Educating the Reflective Practitioner* (San Francisco: Jossey-Bass, 1987), 77.

conceptualization of the environment. Finally, design graphics codify the requisite theories of the environment that promote organizational learning.

It is clear that operational artists use a creative process to determine an operational form that capitalizes on individual and organizational talents. The ecology of operations itself also presents opportunities for creativity. The initial operational form introduces novelty within an operational system. Furthermore, the interaction between rivals and the environment over time creates a coevolutionary dynamic that results in learning and emergence.

To begin, operational planning yields a contextually-dependent approach that must be novel. The development of counterinsurgency warfare in Algeria illustrates this point. David Galula developed a theory of revolutionary warfare using his observations of war in China, and the British and French efforts to reassert colonial authority over the Malay Peninsula and Indochina respectively.[128] He anchored his theory of the phenomenon on the main tenets that control of the population and political commitment were the decisive elements in counterinsurgency warfare.[129] He then developed and operationalized a theory of action for pacification in Algeria that contrasted significantly from the approaches of other French commanders. He declined to attack *Front de Liberation Nationale* (FLN) forces congruent with the tenets of mobile warfare favored by his contemporaries. Rather, he dispersed his forces and followed a program of action to secure population centers, incentivize cooperation between the French and local population, and build confidence in French victory.[130] Many French commanders beyond Galula's battalion declined to adopt his approach to pacification due to an inability to break the patterned thought, myopically focused on mobile warfare that permeated the military. This is most evident in the words of a

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[128] David Galula, *Pacification in Algeria, 1956-1958* (Santa Monica: RAND Corporation, 2006), v-vi.

[129] David Galula, *Counterinsurgency Warfare: Theory and Practice* (St. Petersburg: Hailer Publishing, 2005), 7-9.

[130] Galula, *Pacification in Algeria, 1956-1958,* xxx-xxxix.

preeminent military commander at the time. According to Charles de Gaulle, "I know of two types of warfare: mobile warfare and positional warfare. I have never heard of revolutionary warfare."[131] While operational planning results in a novel approach, it rarely retains this form over time. The prolonged nature of operations allows rival forces to respond and change the nature of the environment. This offers additional opportunities for creative endeavors.

Enacting an operational form provides the opportunity for knowledge creation over time. Rivals become complex adaptive systems as each attempts to act purposefully in pursuit of their strategic goals. This means actors will change their behavior in seeking a better fit with the environment.[132] Rivals will generate feedback as they interact within the environment.[133] Rivals use the same design framing processes to make sense of the environment as it changes. Doctrine broadly refers to this as reframing, and indicates commanders can direct planners to reframe any or all elements of the operational approach when assessments indicate a mismatch between actions and anticipated results.[134] This reframing generates new theories as designers reinterpret their experiences to refine understanding or the operational approach itself. This subjective interpretation of events creates new knowledge.[135] Moreover, this new knowledge can be individual or organizational. In short, it is the evolutionary context of the operational ecology that contributes to

[131] Bernard Fall, *Street Without Joy* (Mechanicsburg, Pennsylvania: Stackpole Books, 1994), 370.

[132] Axelrod and Cohen, 7-8.

[133] Elinor Ostrom, "Sustainable Social-ecological Systems: An Impossibility?" (paper presented at the Annual Meeting of the American Association for the Advancement of Science, "Science and Technology for Sustainable Well-Being," San Francisco, CA, February 15-19, 2007, 4, quoted in Ben Ramalingam, *Aid on the Edge of Chaos* (Oxford: Oxford University Press, 2013), 186.

[134] ATP 5-0.1, 6-2 – 6-3.

[135] Zvi Lanir and Gad Sneh, "Beyond Postmodern Deconstruction," *The New Agenda of Praxis* (Tel Aviv: PRAXIS, 2000), 17.

learning.[136] A further examination of this evolutionary dynamic will reveal other opportunities for novelty to become manifest.

Applying new knowledge may lead to adjusting or recreating operational forms. This represents the same process of conducting additional iterations of design or planning considering the new knowledge mentioned above. It is important to note that there is no objective character to feedback since rivals interpret feedback relative to their strategic logic. This means actors employ abductive reasoning to assess the fit of their operational forms. Abduction, or the process of sensemaking, relies on developing theories that describe well-enough the environment or phenomenon observed.[137] The operational ecology thus exhibits a perpetual creative tension between bounded rationalities as each actor creates and adjusts to new knowledge and actions.

This perpetual dynamic in which reframing and action creates new knowledge also incentivizes deliberate attempts at creative behavior. Complex adaptive systems exhibit evolutionary behaviors. A superior ability for an actor to accurately interpret feedback signals and adjust actions yields a survival advantage. This type of applied learning equates to double-loop learning in which actors evaluate the appropriateness of their actions and not just the fit between expected and observed outcomes.[138] If follows that deliberate efforts to increase variation in an evolutionary context will generate more opportunities for second-order learning. This ability to deliberately introduce variation correlates to the cognitive abilities and processes individuals and organizations employ to that end. In this manner, operational artists have an incentive to experiment prudently to better explore the "adaptive space" of their environment. In short, creativity, as the

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[136] James P. Crutchfield, "What Lies Between Order and Chaos," in *Art and Complexity*, ed. J. Casti and A. Karlqvist (Amsterdam: Elsevier, 2003), 42-43.

[137] Karl E. Weick, Kethleen M. Sutcliffe, and David Obstfeld, "Organizing and the Process of Sensemaking," *Organization Science* 16, no. 4 (July-August 2005): 415.

[138] Chris Argyris and Donald A. Schon, *Organizational Learning: A Theory of Action Perspective* (Reading, Massachusetts: Addison-Wesley, 1978), 20-23.

driver of innovation, is one element that maintains an organization's ability to understand and act purposefully within an environment.

The discussion so far has addressed how individual actors generate novel ideas and approaches; however, interactions between actors and the environment can lead to unanticipated outcomes as well. This occurs when coevolutionary actions create an emergent order unanticipated by the guiding logic relative to one actor alone. In this manner, the evolutionary nature of the system itself can create novel outcomes or environments. American forces in the Revolutionary War provide evidence of this type of emergent operational form during the Trenton Campaign. At this time, the Continental Army and state militias each pursued their own form of warfare. The Continental Army under Washington sought to achieve victory by exploiting defensible terrain to inflict unsustainable casualties on the cost-sensitive British.[139] Militia forces, commanded by their respective local leaders, conducted guerrilla war to harass British forces within their states.[140] Militia actions compelled the British to disperse their forces to counteract the militia's negative influence on the British pacification program.[141] This dispersal created the conditions for Washington to mass his force and strike the isolated Hessian outpost at Trenton. Additionally, the unanticipated presence of militia forces on the east bank of the Delaware River enabled Washington to conduct a follow-on defense of Trenton and subsequent attack on Princeton.[142] These actions in turn compelled the British to concentrate for large-unit actions, increasing their logistics burden and exposing their forage parties to increased attack by militia forces. In short, both the Continental Army and militia forces, through pursuing their respective operational forms, created a synergy in

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[139] David Hackett Fischer, *Washington's Crossing* (Oxford: Oxford University Press, 2004), 79.

[140] Ibid., 179, 193.

[141] Ibid., 185.

[142] Alfred Hoyt Bill, *The Campaign of Princeton, 1776-1777* (Princeton: Princeton University Press, 1948), 75-78.

action that defied their individual capabilities. In short, their successful combined operational form emerged from their interactions and not from deliberate foresight.

Summarizing the discussion above will illustrate why creativity in the context of operational art is more sensitive to individual attributes than the tactical perspective. Operational artists face less-structured problems open to variable individual interpretations. Design processes rely on collaboration for framing and product development which increases the chance for divergent opinions resulting from individual perception and expertise. The resolution of this tension results in both individual and organizational learning, which in turn influences the tacit abilities of the individuals who will conduct subsequent planning efforts. It follows that the amount of expert knowledge and capacity for divergent and lateral thinking will influence that individual's ability to shape the framing activities of design. Additionally, the overall ability for an organization to act purposefully is sensitive to the individual commander. As a hierarchical organization, commanders must approve any candidate operational form. Thus, the individual abilities and experiences of the commander similarly influence the range of possible operational forms. This dynamic reinforces the need for a systemic view of creativity that accounts for the interacting layers of expertise, authority, and environment in creating novel outcomes.

## Creativity and Tactics

There are two primary interpretations of tactics and tactical thought: a theoretical perspective from scholarly military literature and the doctrinal perspective captured in current Army doctrine. This monograph will incorporate both perspectives to address more comprehensively how a systems definition of creativity reconciles with tactical operations and thought. From a theoretical perspective, tactics relates to the control and employment of forces for individual engagements.[143] Tacticians seek to achieve a specific end state, the achievement of

[143] Clausewitz, *On War,* 128.

which represents victory.[144] Army doctrine does not directly define tactics; however, the structure of some of the doctrinal publications indicate a similar concept to its theoretical treatment. Doctrine defines a tactical mission task as "a specific activity by a unit while executing a form of tactical operation or form of maneuver. It may be expressed as either an action by a friendly force or effects on an enemy force."[145] Additionally, the introduction of FM 3-90.1 describes its focus and content as "combined arms tactics used to employ available means to win in combat (the conduct of offensive and defensive tasks) and constitutes the Army's collective view of how units conduct … offensive and defensive actions on land."[146] This statement, and the structure of the manual as a collection of tasks, indicates that tactics correspond to discrete, finite actions intended to achieve specific purposes relative to an enemy or the environment.

This specific ecology of tactics will influence the propensity of creative outcomes as described in the previous sections. To review, creativity is an emergent outcome resulting from the interaction of expertise, process, and environment. Creativity in the tactical context is restricted to adaptive behavior and outcomes and not truly creative ones. This occurs due to the prescriptive planning methodologies used in conducting tactical actions, lack of organizational learning processes, and the nature of interactions at the tactical level.

The purpose and nature of tactical planning methodologies restricts opportunities for theorizing, learning, and collaboration which are integral to generating creative outcomes. Foremost, tactical thinking and planning seeks to conduct a specific action or series of actions that results in a specific effect on either the enemy or the environment.[147] Thus, tactical planning

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[144] Dolman, 126.

[145] Field Manual (FM) 6-0, *Commander and Staff Organization and Operations* (Washington, DC: Government Printing Office, 2014), Glossary-9.

[146] Field Manual (FM) 3-90.1, *Offense and Defense Volume 1* (Washington, DC: Government Printing Office, 2013), ix.

[147] Dolman, 13.

methodologies develop the orders that focus actions within the environment and synchronize resources to bring about the desired end states. In short, tactical planning drives action and focuses on operating within a specific space with known physical, temporal, and logical boundaries.

This focus on action frames tactical thinking on specific outcomes such as a decision, mission, course of action or order rather than on understanding alone.[148] Doctrine defines planning as "the art and science of understanding a situation, envisioning a desired future, and laying out effective ways of bringing that future about."[149] Doctrine further states that planning primarily addresses barriers or conditions that prevent the commander from achieving the desired future state. This frames planning as a component of a broader problem solving methodology.[150] In fact, Army doctrine recognizes three distinct planning methodologies: ADM, MDMP, and Troop-Leading Procedures (TLPs).[151] Doctrine further ties its planning activities to problem-solving by recommending which methodology to use as a function of the complexity of the problem it addresses.[152] Doctrine recommends staffs to use MDMP to address well-structured and medium-structured problems and to use ADM to address ill-structured problems.[153] Doctrine defines medium-structured problems as problems in which problem and end state are clear, but there is disagreement in "how to apply doctrinal principles to a specific piece of terrain against a specific enemy."[154] This doctrinal framework relegates tactical planning to a "search" framework of problem solving in which commanders select a series of actions from a set of preexisting

[148] FM 6-0, 9-1.

[149] ADRP 5-0, 2-1.

[150] Ibid., 2-2.

[151] Doctrine prescribes that units with coordinating staffs primarily use the Military Decision Making Process (MDMP) as their primary planning process.

[152] FM 6-0, 4-1.

[153] Ibid.

[154] Ibid.

capabilities to best address the unique circumstances of the unit, environment, and enemy that seeks to apply an existing set of potential actions. In short, a selection process does not require generating new ideas or solutions, rather it requires the judicious application of tactical tasks to solve a presented or anticipated problem.

Tactical planning methodologies further restrict opportunities for novelty by constraining its knowledge base and inhibiting effective collaboration. The search nature of tactical problem solving restricts potential actions to an existing set of options. In military terms, this set of options corresponds to tactical tasks, enabling tasks, and forms of maneuver found in Army doctrine. Thus, the tactical doctrine itself serves as the knowledge base from which ideation or solutions emerge. Because tactical planning is a search methodology, the process would require additions to or recombination of existing knowledge to generate a novel outcome. The temporal nature of tactics prevents timely additions to the knowledge base to create novelty within the tactical planning cycle. This would require additions to the current set of doctrine which is beyond the time constraints of tactical ecology. Furthermore, the prescriptive nature of tasks themselves prevents their recombination into new tactical tasks or outcomes. Tactical tasks are not aggregated into some new task by echelon, rather commanders arrange tasks in time and space to achieve a specific outcome. Thus, tasks do not truly combine, but complement each other in order to achieve a discernable, premeditated outcome. Because commanders frame end states in doctrinally-precise, existing terms, these outcomes cannot be novel.

The planning process further restricts collaboration and opportunities for novel ideation and perception, elements which contribute to creative outcomes. Rigid guidelines govern almost every aspect of the MDMP. Doctrine specifies the sequential steps of the MDMP in Chapter 9 of FM 6-0. This chapter further specifies the key inputs, processes, and outputs along each of the seven steps of MDMP. It also includes agendas and sample formats for the required briefs and products during the process that terminates with orders production. Furthermore, these key inputs and outputs often

correspond to a specific staff section or Warfighter Functions (WfF). For example, updating running estimates is a critical output of conducting mission analysis (step 2 of MDMP).[155] Logistics doctrine and planning support materials further prescribe what specific information to provide for this product. It further prescribes what specific actions to take during the remaining steps of MDMP, to include what graphic controls to add to the course of action sketch.[156]

This prescriptive framework has two critical influences on creativity. First, it removes any need to develop new ideas about how to approach the planning process due to its myopic focus on the end state. Additionally, dividing work steps and outputs by functional expertise reduces the need to collaborate. Knowledge management literature indicates collaboration can promote creativity via idea generation because groups will need to develop new ideas or adopt new perspectives to resolve tension created by competing theories about an environment or a solution.[157]

This division of efforts and compartmentalized approach to planning also inhibits an organization's ability to generate new knowledge or learn, both of which require creativity. Organizational learning requires a unit to produce a formalized hypothesis of its environment.[158] Organizations must also institute "rules for learning" to apply abstracted experiences or theories with a communication strategy that distinguishes future behavior as adaptation and not "rote iteration of past successful actions."[159] Army doctrinal tactical planning lacks the requisite formalized communications framework to coordinate distributed experiences for higher-level

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[155] FM 6-0, 9-7.

[156] Student Text (ST) 4-1, *Theater Sustainment Battle Book* (Fort Leavenworth, Kansas: Command and General Staff Officer Course Material, 2013), 2-8, 3-11.

[157] Nonaka, 43.

[158] Mariann Jelinek, *Institutionalizing Innovation* (New York: Praeger Publishers, 1979), xviii.

[159] Ibid., 161-162.

abstraction due to its reliance on mission-oriented orders and prescriptive structure of unit after-action reviews (AARs).

Foremost, orders are the primary means of communicating at the tactical level. Paragraph one (Situation) or Annex Bravo come closest to presenting a formalized hypothesis of the environment; however, it is descriptive in nature and limited to discussing anticipated actions of a rival or other actor. Furthermore, doctrine prescribes units to present the higher headquarters' understanding and visualization of the enemy as a part of its intelligence annex.[160] This could potentially lead to conformity bias if subordinate staffs accept such inputs uncritically. Additionally, the use of mission-orders to synchronize tactical actions anchor subordinate units to their parent unit's understanding of the environment and enemy. This is seen in how subordinate units adopt information requirements and additional tasks from a parent unit as a part of the intelligence collection plan or higher unit's branch or sequel plans. This organizational nesting and the one-way nature of orders results in efficient use of resources; however, it removes flexibility for subordinate units to operate with a divergent view of the environment. The lack of formalized assessments to invalidate an operating hypothesis, combined with the short-duration nature of tactical engagements, further restrict a unit's ability to increase organizational knowledge. In fact, if decision points fail to correspond to tactical reality, the ecology of tactical engagements prevents a force from abstracting patterns of thought and thus execution becomes fragmentary and less collaborative.

The doctrinal structure of after-action reviews, the one formal procedure in doctrine aimed at learning, also fails to promote organizational learning. The Army's AAR procedure does not require abstracting experiences for higher-level synthesis. This is evident in doctrine's overall focus on the unit's performance relative to its plan rather than a focus on the plan's merits relative to an

[160] FM 6-0, D-11.

enemy or the environment. Doctrine defines an AAR as "a guided analysis of an organization's performance … with the objective of improving future performance."[161] Doctrine further states that AARs aim to reconcile observations of performance with what the unit planned to do for the sake of correcting task performance deficiencies.[162] It further recommends updating unit standard operating procedures or capturing updates as lessons-learned.[163] However, it stops short of clarifying how best to dispose of after-action reports beyond stating that they should be sent to other units conducting a similar mission, doctrinal proponents, generating force agencies, and the Center for Army Lessons Learned (CALL).[164] Doctrine does not specify what actions to take beyond sending reports, such as how to coordinate disparate reports to create refined understanding. This lack of a forcing function to abstract experience to refine environmental understanding limits learning to the tacit domain of the individuals who participate in a specific AAR. This restricts any learning that does occur to enhancing organizational memory, but not organizational knowledge.

Some readers may sense a biased argument in this section's sole focus on MDMP as the process that supports tactical planning. Doctrine does in fact permit the use of ADM to support tactical planning.[165] However, the context of tactics prevents tactical planners from leveraging novel outcomes from design processes. While design can lead to a better understanding of the environment, tacticians still employ a search-model of decision making framework in which they select tasks and forms of maneuver from an existing body of doctrinal knowledge. The focus of any tactical design process would be to refine understanding of the environment, enemy, or friendly

[161] FM 6-0, 16-1.

[162] Ibid., 16-2.

[163] Ibid.

[164] Ibid., 16-2.

[165] Ibid., 9-1.

mission to ensure selected tactical actions conform to their requirements. This dynamic inhibits the opportunity for novel actions or insight and limits tactical organizations to adaptive behaviors.

To review, the ecology of tactics and the organizational approach to planning limit the opportunity for tactical creativity. The teleological nature of tactics attempts to remove uncertainty and variation in outcomes, reducing the value of novel action or outcomes. The MDMP, as a prescriptive planning process, does not incentivize collaboration of a nature that leads to novel ideation or organizational learning. This procedural approach also anchors planners within their specific area of expertise or WfF, further inhibiting conceptual exploration. Finally, doctrine's teleological treatment of tactics focuses organizational learning activities on process improvement and best practices rather than the creation of new knowledge.

## Conclusion

The discussion above addressed creativity in the context of military operations. It seeks to inform readers of the mechanics governing creative outcomes and how the value and propensity of creativity depends on perspective. Neither Army doctrine nor literature adequately addresses the phenomenon. Both treat creativity as a specific way of thinking to complement critical thought, effectively reducing it to an individual attribute that should lead to better judgment or ideas. This "black-box" understanding fails to inform commanders and staffs about ways to promote or exploit novel outcomes or artifacts. This monograph uses systems theory to define creativity as novel outcomes resulting from the interplay between expertise, cognitive ability, process, and ecological context of operation. This definition illustrates how the nature and value of creativity changes with perspective. From a strategic perspective, creativity is manifest in the novel theories that provide the guiding logic for operational planning. Similarly, operational artists develop novel theories to describe the environment and guide action; however, creativity most influences organizational learning. Finally, the ecology and logic of tactics creates a system that favors adaptation over novelty.

The function and ecology of strategy produces novel theories that guide the development of operational form. Fundamentally, strategy is the pursuit of perpetual advantage within the strategic environment. This broad mandate creates the space for strategists to develop novel theories to both describe the environment and act purposefully within it in pursuit of strategic advantage. It follows that the cognitive ability of the individual strategist significantly influences the originality and value of such theories. The strategic environment also incentivizes and demands perpetual novelty. Strategic thinking is not bound to a specific temporal horizon. Further, both the action of rivals and changes in the strategic environment alter the strategist's theory of advantage or action. This dynamic creates the impetus for perpetual theorizing to ensure both logic and action conform to the changing contextual nuance of the strategic environment. Finally, strategy influences the development and modernization of the military means to act within a contested environment, thus influencing the range of potential actions available to subordinate operational artist or tacticians. In short, strategists intentionally exploit novelty in generating the discourse that guides subordinate action.

Operational artists create theories of action and new knowledge as novel outcomes in synthesizing an operational form congruent with strategic logic and tactical capabilities. Doctrine advocates the use of ADM to employ operational art.[166] Design processes require theorizing in framing the operational environment and approach. Here again, individual expertise and divergent-thinking abilities will influence the propensity for novelty in theorizing. However, ADM advocates reframing to continuously reconcile operational experiences with the theories that guide action. This, combined with the complex and adaptive nature of military forces in conflict, creates a mechanism to create new knowledge and understanding at both the individual and organizational level. The collaborative nature of design also enhances individual learning and increases the

[166] ATP 5-0.1, 1-5.

likelihood of novel action. This occurs because collaboration allows individual planners access to distributed knowledge they do not possess. This effectively extends the range of potential idea recombination available to a staff. The loose structure of collaboration also promotes novel ideation by focusing planners on framing activities rather than on their individual expertise. This creates opportunities for conflict and dialogue that lead to learning. Finally, ADM offers some techniques to combat biased thought that constrain novel ideation.

In contrast to the strategic and operational perspective, the tactical ecology and processes generate adaptive outcomes rather than creative ones. Tacticians attempt to remove uncertainty from operations.[167] They attempt to bring about a specific outcome relative to an enemy or the environment. Thus, the tactical perspective focuses on a singular engagement with a predetermined outcome and does not require theorizing to account for change throughout the duration of an operation. Rather, tacticians use predetermined decision points to address uncertainty and change. Tactical processes further constrain creative outcomes. Army doctrine advocates the use of the MDMP to plan tactical actions. As a process, MDMP is prescriptive in how planning occurs, including the format of planning products, briefs, and orders. These formats favor a functional approach to planning in which planners myopically focus on integrating their specific warfighter function into the tactical plan. This compartmentalization in planning removes the impetus for collaboration and synthesis and suppresses novel ideation and learning. Doctrine further constrains tactical novelty by specifying the range of tactical actions available to planners. This creates a problem-solving structure that favors a search approach rather than a generative one in that tactical planners select from an existing range of capabilities to achieve the desired effect on the enemy or environment. This search method, combined with the singular nature of tactical engagements,

[167] Dolman, 9.

inhibits creating new knowledge as after-action reviews focus on how tactical actions conformed to the plan rather than how the plan conformed to the logic of action or the environment.

Several key insights emerge from the discussion above. First, a system's view of creativity invalidates how the Army presents it in doctrine. Doctrine implies creativity is a specific type of thinking. In reality, divergent thinking is just one aspect of the system that may lead to novel outcomes. While individual knowledge and abilities represent the limit of creative potential for an organization, organizational structure and processes may inhibit the ability to operationalize novel ideas. This is evident in the commander-centric hierarchy of Army organizations. Commanders assess the feasibility, acceptability, and suitability of potential plans before approving them.[168] In this manner commanders act as a gatekeeper in regulating what ideas influence the actions of the organization. It is clear that the temperament and abilities of the commander significantly influences the propensity for novel military outcomes.

Extending the systems view further complicates this dynamic. The strategic, operational, and tactical perspectives do not exist in isolation from each other. Each perspective should influence the others. The value of novelty that governs strategic thinking should permeate to the tactical perspective. Similarly, tactical actions should conform to the logic of strategic advantage. The continuous organizational learning from the operational perspective should inform both tactical planning and refine strategic thinking (creating opportunities for learning at the strategic level). Furthermore, operational artists should use tactical engagements as opportunities for experimentation to refine their understanding of the environment and its influence on the operational form. The interaction between the perspectives can similarly constrain the potential for creative outcomes. The same hierarchical dynamics within a military organization also occurs between organizations. Prescriptive orders or rigid adherence to doctrine could constrain thinking

[168] ADRP 5-0, 1-6.

or action. Fortunately, the converse is true in that a deliberate focus on new ideas may break habits of biased or patterned thought and inculcate divergent thinking among commanders and staffs.

This exposes opportunities for further research that could improve the Army's concept and treatment of creativity. While this monograph addresses creativity in the context of the strategic, operational, and tactical perspectives holistically, there could be value in isolating specific warfighter functions or elements for similar consideration. Additional research into the relationship between linguistic abilities and novel ideation could offer insight into procedural ways to incentivize creative behaviors during design or planning. A similar look at the relationship between graphological activities and idea generation could yield additional benefit and extend tools available to planners for conceptual exploration. Finally, more research into the nature of collaborative work could yield valuable insight into what activities or environmental factors inhibit the creative potential of groups. Such research would extend the discussion of military creativity and provide key insights to assist military professionals to exploit the creative potential of their organizations.

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